

We claim:

1. A process for preparing acid formats in which
 - 5 - a liquid stream I containing formic acid and
 - a liquid stream II containing a metal formate,are provided and
 - 10 the liquid stream I is mixed with the liquid stream II, obtaining the corresponding acid formate, which comprises feeding, to the liquid stream I or a precursor thereof, to the liquid stream II or a precursor thereof, or to the mixture of the liquid streams I and II, a liquid stream III containing the components below at contents of in each case > 0.1% by weight:
 - 15 - metal formate,
 - metal methoxide,
 - methanol and
 - methyl formate (MeFo),
 - 20 which is produced in a process for preparing MeFo by carbonylating methanol in a reactor at a pressure up to 50 MPa absolute in the presence of a metal methoxide as homogeneous catalyst, with
 - 25 - withdrawal of the reaction mixture as gas stream in the upper region of the reactor and
 - withdrawal of a liquid side stream from the reactor as stream III, or withdrawal of the reaction mixture as liquid stream IV, by separating off MeFo and methanol from stream IV.
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2. A process as claimed in claim 1, wherein MeFo are separated off from the liquid stream IV by distillation in a column by direct introduction of steam.
3. A process as claimed in either claim 1 or 2, wherein the liquid stream I is
 - 35 obtained starting from MeFo, with
 - (a) MeFo being partially hydrolyzed and

(b) the reaction mixture of the partial hydrolysis from process stage (a) being separated by distillation into a lower-boiling stream V, comprising MeFo and methanol, and the higher-boiling stream I, comprising formic acid and water.

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4. A process as claimed in claim 3, wherein water and MeFo are used in the process stage (a) in a molar ratio of from 0.1:1 to 10:1, in particular in a molar ratio of from 6:1 to 3:1.

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5. A process as claimed in either claim 3 or 4, wherein the liquid stream V is recirculated to the process stage (a).

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6. A process as claimed in either claim 2 or 3, wherein the stream V comprising MeFo and methanol is transferred to stream II containing metal formate and water, in process stage (c), by

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(i) reaction with a basic compound having a pK_a of the conjugate acid of the corresponding dissociation stage of ≥ 3 , measured at 25°C in aqueous solution, in the presence of water, and

(ii) removal of the methanol by distillation.

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7. A process as claimed in claim 6, wherein the process stages (i) and (ii) are carried together in one column.

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8. A process as claimed in any one of claims 3 to 5, wherein the metal formate-containing stream II is produced by carbonylating the corresponding metal hydroxide.

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9. A process as claimed in any one of claims 1 to 9, wherein the liquid stream I and the liquid stream II are mixed in a column (E), the bottoms liquid containing acid formate and water is taken off, the acid formate is separated off by crystallization, spray granulation, spray drying or melt crystallization, and this acid formate is isolated.

10. A process as claimed in any one of claims 1 to 9, wherein the acid formate

prepared is acid potassium formate, acid sodium formate, acid calcium formate or mixtures thereof, potassium formate, acid sodium formate, acid calcium formate or mixtures thereof, potassium diformate, sodium diformate, sodium tetraformate or mixtures thereof.

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11. A process as claimed in any one of claims 1 to 10, wherein the process for preparing MeFo by carbonylating methanol with carbon monoxide in a reactor in which the liquid stream III is produced as a side stream, is carried out at a pressure of from 0.5 to 10 MPa absolute and at a temperature of from 50 to 150°C in which a gas stream is taken off from the reactor, entrained MeFo is separated off from the gas stream by condensation and the remaining gas stream is completely or partially recirculated to the reactor as circulated gas stream, a mean gas superficial velocity of from at least 1 to 20 cm/s, preferably of from at least 2 to 10 cm/s, being set in at least one region of the reactor in which the gas flows essentially in one direction.
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12. A process as claimed in claim 10, wherein the metal methoxide is used as homogeneous catalyst in the carbonylation of methanol with carbon monoxide at a concentration of from 0.01 to 2 mol/kg of liquid reaction mixture, and the metal methoxide used is preferably potassium methoxide.
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13. A process as claimed in either claim 11 or 12, wherein the methanol is carbonylated to form MeFo at a pressure of from 2 to 4 MPa absolute and at a temperature of from 60 to 85°C.
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14. A process as claimed in any one of claims 11 to 13, wherein a molar ratio of the total amount of the methanol fed to the reactor to the amount of freshly supplied carbon monoxide of from 1.4 to 3.3:1, preferably 2:1, is set.
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15. A process as claimed in any one of claims 11 to 14, wherein the reactor used for preparing MeFo is a bubble column and this is operated in a cocurrent flow procedure with respect to the feed of the methanol-containing liquid stream and the carbon monoxide-containing gas stream.
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16. A process as claimed in any one of claims 11 to 14, wherein the reactor used for preparing MeFo is a cascade reactor, and preferably the top zone of the cascade reactor is operated at a temperature of from 80 to 150°C.
- 5 17. A process as claimed in any one of claims 11 to 16, wherein the gas stream withdrawn from the reactor is separated in an enrichment column into an MeFo-containing bottom stream and a carbon monoxide- and MeFo-containing top stream, entrained MeFo is separated off from the top stream by condensation and the remaining gas stream is completely or partially
10 recirculated to the reactor as circulated gas stream.
18. The use of the acid formates prepared in a process as claimed in any one of claims 1 to 17 for preserving and/or acidifying plant material and/or animal
15 material.
19. The use of the acid formates prepared in a process as claimed in any one of claims 1 to 17 for treating biowastes.
20. The use of the acid formates prepared in a process as claimed in any one of
20 claims 1 to 17 as additive in animal nutrition and/or as growth promoter for animals.